

Remarks

The present invention is directed to a hot-melt adhesive with improved hot-melt stability. Hot-melt adhesives by their very nature must be able to perform adequately at very high temperatures. Otherwise the temperature will either fail to adhere, degrade or otherwise not perform sufficiently as an adhesive. Those skilled in the art can appreciate that no one wants tape, glue or package sealer which fails. Part of the desired characteristics for these particular hot-melt adhesives is characteristic of having a viscosity that varies only about 5% above or below its initial value over a period of 24 hours at 77°C. This specific, beneficial characteristic can only be achieved by using polymers that have a specific microstructure that yields the specific final product. As detailed in the specification, De Keyzer et al. does not teach products that have the required viscosity characteristics and do not have the required coupling efficiencies and do not teach the correct molecular weight nor the hot-melt viscosity.

In the Office Action the examiner refers to Polymer E in De Keyzer et al., as it appears in Tables 1 and 2. Polymer E is not a polymer of the present invention. Polymer E has a total molecular weight that is outside the range of the present invention, a coupling efficiency that is too high, and a hot-melt viscosity that decreases beyond the claimed range set forth in all independent claims of the present invention. Specifically, Polymer E as noted in Table 2 has a total molecular weight of 195,000. Claims 11, 16, 21, and 26 all claim a molecular range for the present invention of from 180,000 to 190,000. While the molecular weight of composition E is 5,000 too high it has other characteristics which are also not within the claims. The coupling efficiency of the same independent claims just recited is in a range of from 63 to 80% maximum. Composition E has a coupling efficiency of 87% meaning that it couples much more than the present invention and this likewise has an effect on viscosity among other properties. Note that Polymer E includes component A. Polymer E has no tacifying resin and has no plasticizer. These components are in example 1 of De Keyzer et al. De Keyzer et al. did not test Polymer E because, from De Keyzer's point of view, Polymer F was superior. In Table 4 of De Keyzer et al. two comparative example polymers were prepared and Polymer F was prepared with a tacifying resin and a plasticizer. In Example 3 and Table 6 the comparative Example 1 (see F1) and F2 were compared for the aging test set forth by the present invention. It is clear that the comparative formula 1 had a 78% increase in the viscosity which would make this polymer

totally unfit for hot-melt adhesive. Likewise, Polymer F2 also had an increase of 50% in the heat melt viscosity making it unsuitable for the present invention. If F2, which is based on Polymer B, is the best formulation in De Keyzer et al., it would certainly inform one skilled in the art that Polymer E would likely also have an increase in the hot-melt viscosity way beyond the bounds of the present invention.

Note, however, that the present invention compared Polymer E to the properties of the suitable polymers having plasticizer and tackifying resin. See Tables 2 and 4 and comparative Example B of the present invention to De Keyzer. and compare this with Example E or Polymer E, Table 2 of De Keyzer et al. These are the same composition. Note that in Table 4 the hot-melt viscosity at 177°C for 24 hours was greater than 10% variation, while the present claims desire a hot-melt viscosity with less than a 5% overall variation. Because the coupling efficiency of De Keyzer et al. exceeds the coupling efficiency of the present invention and because the molecular weight of De Keyzer et al. is higher than the maximum range set forth in the present invention, compounds made according to De Keyzer et al. fail the hot-melt viscosity requirement – they are outside the scope of the present invention.

In the October 26, 2010, it is noted that the examiner goes to Table 12, Example F30 which contains Polymer E and a tackifying resin and a plasticizer. Some components fall within the range of what is claimed by the present invention, however, it is noted that no hot-melt viscosity was run on Polymer E by De Keyzer et al. De Keyzer et al. conducted an initial hot-melt viscosity at 190°C, not 177°C. De Keyzer et al. shows an initial hot-melt viscosity of composition F30 having 74 Pa.s. At 177°C composition B in Table 4 has an initial hot-melt viscosity of 115°C. It is also noted that composition F has Irganox 1010 - an antioxidant. The present invention calls for “consisting of” and not “comprising” and thus the Irganox 1010 may very well have a negative effect upon the hot-melt viscosity after 24 hours at 177°C. It is clear, however, that in the comparison done by De Keyzer et al. alone (as compared to the present invention to De Keyzer) the hot-melt viscosity varied more than 10%.

The inventor of the present invention is of course the primary inventor set forth in the reference cited by the examiner. While it wasn't at all obvious to De Keyzer that the

formulations set forth in his earlier patent application would be suitable for hot-melt adhesives. It is interesting that the examiner states that “it would be the examiner’s position that the application contained inadequate disclosure that there is no teaching as to how to obtain the claimed properties and effects by combining only these ingredients”. Just in a reading of De Keyzer et al., it is noted that small variations in the percentage in the amount of polystyrene, and of the molecular weight, have a big effect on the invention of De Keyzer et al. Specifically, Polymer A and Polymer B in Tables 1 and 2 of De Keyzer et al. were compared with one another and formula 2 based on Polymer B is actually stated to show better characteristics such as a lower hot-melt viscosity than CF1 which is based on Polymer 1. See Example 1 in where CF1 based on Polymer A and F2 based on Polymer B are compared in their initial hot-melt viscosity in Table 4 and again in Table 6 where those minor differences of Polymer A and Polymer B result in a percentage increase of 78% for Polymer A but only 50% increase for Polymer B. This would certainly teach one skilled in the art that small minor differences have a large effect on the hot-melt viscosity. De Keyzer in the present application was the chief inventor in De Keyzer et al. If it wasn’t obvious to him then why would it be obvious to the examiner?

It is submitted that the small differences set forth in the present invention and Polymer E of De Keyzer et al. easily accounts for the significantly improved composition of the present invention which is a vary narrow range in all respects for each component of the present invention and has the desired effect. Essentially, the present invention is a unrecognized narrower range invention within De Keyzer et al. that is now being recognized and claimed in the present invention to De Keyzer. De Keyzer et al. did not recognize the narrower invention of the present application.

It is submitted that the present invention is entitled to a patent and such is solicited.

Respectfully submitted,

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/Gregory N. Clements/ 

Gregory N. Clements
Registration No.: 30,713
Attorney for Applicant

CLEMENTS | BERNARD
1901 Roxborough Road, Suite 250
Charlotte, North Carolina 28211 USA
Telephone: 704.790.3600
Facsimile: 704.366.9744
gclements@worldpatents.com

GNC/mc

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